CLAIMS

1. A lens having an axis of symmetry, comprising:

a transparent circumferential surface, circumferentially extending about said axis of symmetry, said transparent surface having optical power in planes which include said axis of symmetry;

a first reflective surface, symmetric with respect to said axis of symmetry and being operative to reflect light passing through said transparent surface; and

a second reflective surface, symmetric with respect to said axis of symmetry and axially spaced from said transparent surface and being operative to reflect light reflected by said first reflective surface.

2. A lens according to claim 1, and wherein said lens is formed of at least one of glass and plastic.

3. A lens according to either of claims 1 and 2, and wherein said transparent circumferential surface receives light from a 360-degree field of view about said axis of symmetry.

4. A lens according to any of the preceding claims and wherein said first transparent circumferential surface is transparent to radiation at a specific range of wavelengths.

5. A lens according to any of the preceding claims, and wherein said transparent circumferential surface is operative to refract light onto said first reflective surface.

6. A lens according to any of the preceding claims and also comprising an additional circumferential surface disposed between said transparent circumferential surface and said second reflective surface.

7. A lens according to claim 6, and wherein said transparent circumferential surface has a first curvature and said additional circumferential surface has a second curvature, said second curvature being generally different than said first curvature.

8. A lens according to any of the preceding claims, and wherein said additional circumferential surface is operative to enhance an axial field of view of said lens.

9. A lens according to any of the preceding claims, and wherein said additional circumferential surface smoothly joins said transparent circumferential surface.

10. A lens according to any of the preceding claims and wherein at least one of said first and second reflective surfaces is a convex reflective surface.

11. A lens according to any of the preceding claims and wherein each of said first and second reflective surfaces is a convex reflective surface.

12. A lens according to any of the preceding claims and wherein said second reflective surface directs light generally along said axis of symmetry.

13. A lens according to any of the preceding claims and wherein at least one of said first and second reflective surfaces is annular.

14. A lens according to any of the preceding claims and wherein each of said first and second reflective surfaces is annular.

15. A lens according to any of claims 3 – 14 and wherein said second reflective surface also comprises a curved portion which has a transparent surface and which is symmetric with respect to said axis of symmetry, operative to refract rays from a field of view which is at least partially different than said 360-degree field of view.

16. A lens according to claim 15, and wherein said curved portion has a curvature which is different than a curvature of said second reflective surface.

17. A lens according to either of claims 15 and 16 and wherein said transparent surface of said curved portion is transparent to radiation at a specific range of wavelengths.

18. A lens according to any of the preceding claims and wherein said first reflective surface also comprises a central area which has a transparent surface and which is symmetric with respect to said axis of symmetry.

19. A lens according to claim 18, and wherein said central area has a curvature which is different than a curvature of said first reflective surface.

20. A lens according to either of claims 18 and 19 and wherein said transparent surface of said central area is transparent to radiation at a specific range of wavelengths.

21. A lens according to any of claims 4, 17 and 20 and wherein said specific range of wavelengths includes visible wavelengths.

22. A lens according to any of claims 4, 17 and 20 and wherein said specific range of wavelengths includes infrared wavelengths.

23. A lens according to any of the preceding claims and also comprising at least one additional lens arranged to direct light axially through said lens.

24. A lens according to claim 23 and also comprising a shield element operative to protect said at least one additional lens.

25. A lens according to either of claims 23 and 24 and wherein a field of view of said at least one additional lens at least partially overlaps a field of view of said lens,

providing stereoscopic viewing of at least one object lying in the overlapped portions of said field of view of said at least one additional lens and said field of view of said lens.

26. A lens according to any of the preceding claims and also comprising at least one aberration correcting lens arranged to correct aberrations of light passing through said lens.

27. A lens according to any of the preceding claims and also including at least one of a first base portion and a second base portion.

28. A lens according to claim 27, and wherein said first base portion is disposed about said first reflective surface.

29. A lens according to either of claims 27 and 28, and wherein said second base portion is disposed about said second reflective surface.

30. A lens according to any of claims 27 – 29, and wherein at least one of said first base portion and said second base portion is integrally formed with said lens.

31. A lens according to any of claims 27 – 29, and wherein at least one of said first base portion and said second base portion is mounted onto said lens.

32. A lens according to any of claims 27 – 31, and wherein at least one of said first base portion and said second base portion is operative to mount said lens onto additional optical elements forming an optical system.

33. A lens according to any of claims 27 – 32 and wherein at least one of said first base portion and said second base portion is operative to mount said lens onto at least one mechanical element.

34. A lens according to any of the preceding claims and wherein light passing through said lens is directed onto an imaging element.

35. A lens according to claim 34 and wherein said imaging element comprises a CCD array.

36. A lens according to any of the preceding claims and also comprising a non-axially symmetric reflecting surface having optical power for focusing light from a region limited in azimuth and elevation through said lens.

37. A lens according to claim 36, and wherein said non-axially symmetric reflecting surface comprises a convex surface.

38. A lens according to claim 36, and wherein said non-axially symmetric reflecting surface comprises a generally planar surface.

39. A lens according to any one of claims 36 – 38 and wherein said additional circumferential surface is operative to refract light received by said lens onto said non-axially symmetric reflecting surface.

40. A lens according to any of the preceding claims and wherein said lens is operative to enable illumination of a field of view from a source of light located in an image plane.

41. A lens according to any of the preceding claims and also comprising at least one light pipe, operative to illuminate the field of view of said lens.

42. A lens according to claim 41, and wherein said light pipe includes at least one inclined edge surface.

43. A lens according to either of claims 41 and 42, and wherein said light pipe includes optical fibers.

44. A lens according to either of claims 41 and 42, and wherein said light pipe comprises a hollow light pipe.

45. A lens according to any of claims 41 – 44 and wherein said light pipe is disposed about said first reflective surface.

46. A lens according to any of claims 42 – 45, and wherein said at least one inclined edge surface is operative to scatter light rays emitted from said light pipe.